Baumann™ 24000C Carbon Steel Little Scotty™ Control Valve

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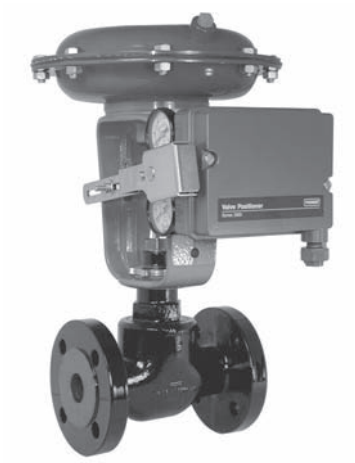
Figure 1. 24000C Control Valve with Baumann 32 Actuator and Fisher® 3661 I/P Positioner



Introduction

Baumann 24000C carbon steel Little Scotty industrial control valves (figure 1) are intended for general utility service in pressure, flow, and temperature control applications.

Scope of Manual

This instruction manual includes installation, maintenance, and parts information for the Baumann 24000C control valve.

Do not install, operate, or maintain Baumann 24000C control valves without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety cautions and warnings. If you have any questions about these instructions, contact your Emerson Process Management sales office before proceeding.

⚠ WARNING

Always wear protective gloves, clothing and eyewear when performing any installation operations to avoid personal injury.

Personal injury or property damage caused by sudden release of pressure or bursting of pressure retaining parts may result if service conditions exceed those for which the product was intended. To avoid injury or damage, provide a relief valve for over pressure protection as required by government or accepted industry codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

CAUTION

This valve is intended for a specific range of pressures, temperatures and other application specifications. Applying different pressures and temperatures to the valve could result in parts damage, malfunction of the control valve or loss of control of the process. Do not expose this product to service conditions or variables other than those for which the product was intended. If you are not sure what these conditions are you should contact your Emerson Process Management sales office for more complete specifications. Provide the product serial numbers (shown on the nameplate) and all other pertinent information.

⚠ WARNING

If you move or work on an actuator installed on a valve with loading pressure applied, keep your hands and tools away from the stem travel path to avoid personal injury. Be especially careful when removing the stem connector to release all loading on the actuator stem whether it be from air pressure on the diaphragm or compression in the actuator springs.

Likewise take similar care when adjusting or removing any optional travel stop. Refer to the relevant actuator Maintenance Instructions.

If hoisting the valve, take care to prevent people from being injured in case the hoist or rigging slips. Be sure to use adequate sized hoists and chains or slings to handle the valve.

⚠ WARNING

Personal injury could result from packing leakage. Valve packing is tightened before shipment; however, the packing might require some readjustment to meet specific service conditions.

Maintenance

⚠ WARNING

Avoid personal injury and property damage from sudden release of process pressure or bursting of parts. Before performing any maintenance operations:

- **Do not remove the actuator from the valve while the valve is still pressurized.**
- **Always wear protective gloves, clothing, and eyewear when performing any maintenance operations.**
- **Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve. Drain the process media from both sides of the valve.**
- **Depending on the actuator construction, it will be necessary to manage the pneumatic actuator spring pre-compression. It is essential to refer to the relevant actuator instructions in this manual to perform safe removal of the actuator from the valve.**
- **Use lock-out procedures to be sure the above measures stay in effect while you work on the equipment.**
- **The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.**
- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

Note

Whenever a gasket seal is disturbed by removing or shifting gasketed parts, install a new gasket during reassembly. This provides a good gasket seal because the used gasket may not seal properly.

⚠ WARNING

Avoid personal injury or property damage by thoroughly cleaning the line of all dirt, welding chips, scale, oil or grease, and other foreign material. Failure to do so could result in damage to the seating and sealing surfaces of the valve and result in damage to the valve and release of process materials.

Installation

Refer to key numbers in figure 2 unless otherwise specified.

1. Before installing the valve in the pipeline, thoroughly clean the line of all dirt, welding chips, scale, oil or grease, and other foreign material.
2. Install the valve so the controlled fluid will flow through the valve body in the direction indicated by the arrow cast on the valve body.
3. A three-valve bypass would permit removal of the control valve from the line without shutting down the system.
4. In case of a heat-insulated installation, insulate the valve body only, not the bonnet.

⚠ WARNING

To avoid personal injury or property damage, do not attempt to do any work on a valve while the system is in operation. The valve must be isolated 100% from the active system and the isolated line voided of pressure and/or hazardous fluids.

Air Piping

1. For an air-to-extend actuator (air-to-close action), connect the actuating air pressure line to the 1/4 NPT opening in the upper diaphragm case. For an air-to-retract actuator (air-to-open action) connect the actuating air pressure line to the 1/4 NPT opening in the lower diaphragm case.
2. Use 6.4 mm (1/4 inch) O.D. tubing or equivalent for all air lines. If air line exceeds 8 m (25 ft) in length, 9.5 mm (3/8 inch) tubing is preferred. Air pressure should not exceed 2.5 barg (35 psig).

CAUTION

- **When assembling or disassembling the valve, do not turn the valve stem while the plug is touching the valve seat. This will damage the valve's seating surfaces.**
- **When adjusting the valve stem do not grip the stem directly with pliers or a wrench. This will damage the surface of the stem, and cause damage to the packing in the valve. Instead, counter-tighten the two locknuts (key 27) on the stem (key 5). This will allow you to turn the stem by turning the locknuts (key 27) with a wrench.**
- **When placing valve in a vise, clamp the flat end faces of the valve. Do not clamp the rounded sides of the valve. This will distort the shape of the casting, and will ruin the valve.**

Disassembly

1. Mount the valve in a vise by clamping flat end faces of the valve (figure 2). Caution must be taken not to damage the serrated flange faces.
2. Remove the actuator, stem locknuts (key 27), travel indicator (key 58)) and yoke drive nut (key 9).
3. Turn the bonnet (key 8) in a counter-clockwise direction from the valve body (key 1). Remove the O-ring (key 12) and remove and discard the valve body gasket (key 49). A new gasket should be installed each time the valve is disassembled.
4. Pull the plug and stem assembly (keys 4 and 5) out through the bottom of the bonnet. Rotate the assembly to prevent damage to the packing. Wipe the parts with a clean soft cloth and examine for signs of wear.

CAUTION

Handle the parts carefully to avoid damaging the seating and guiding surfaces.

5. To remove the seat ring (key 2), fabricate a special wrench to engage the lugs on the ring. Turn the seat ring (key 2) counter-clockwise to remove it from the valve body (key 1). Clean thoroughly and examine for signs of wear.

Lapping the Metal Seat

If valve seat leakage becomes excessive, it may be necessary to lap the valve seat.

Lapping is the process of mating the valve plug to the seat ring, with an abrasive to produce a close fit. When valve seat leakage becomes excessive, lapping becomes necessary. The plug and seat ring seating surfaces should be free of large scratches or dents and the contact surface of the seats should be as narrow as possible.

1. Use a good quality lapping compound with a mixture that contains 280 to 600 grit. Apply at several spots around the plug seating surface. Replace the plug (key 4) in the bonnet (key 8).
2. Place the bonnet (key 8) loosely into the valve body (key 1) to serve as a guide during the lapping operation.
3. Lap the valve by applying a slight pressure on the stem and rotate the stem in short oscillating strokes approximately 8 to 10 times or until you see an even and complete lap line. The plug should be intermittently lifted and turned 90 degrees while lapping to keep the plug and seat ring concentric.

4. Clean the valve seat and plug (key 4) thoroughly when the lapping is complete, removing all traces of lapping compound.

Replacing Packing

Refer to the standard packing construction and the optional packing shown in figures 2, 3, and 4 to determine the packing that has been preinstalled in your valve.

1. Disassemble the valve as directed earlier. Remove the locknuts (key 27) and indicator disk (key 58), and turn the plug and stem (keys 4 and 5) out through the packing box. Remove the packing follower (key 10). Push out the old packing (key 14) by working from the underside of the bonnet (key 8).
2. Standard spring loaded PTFE V-ring packing (figures 2 and 3): Insert each piece in exact order shown in figures 2 and 3. Hand tighten the packing follower (key 10) until it shoulders on the bonnet (key 8). This will compress the packing spring (key 6), to enable constant stem sealing throughout the packing life.
3. Molded graphite (flexible graphite) packing (figure 4): Insert each piece in exact order shown in the figure 4. Hand tighten the packing follower (key 10). Use a wrench to increase tightness by turning the nut an additional 60 degrees.

Actuator and Valve Body Reassembly

1. Insert a new valve body gasket (key 49) and install the bonnet assembly (key 8) with the plug and stem assembly in the valve. The O-ring (key 12) must be reinstalled by gently stretching over the bonnet and snapping into the gap between the top of the valve body (key 1) and the bonnet (key 8). This O-ring acts as a dust/moisture seat.
2. Place the actuator yoke over the stem (key 5). While tilting the actuator back, drop the yoke drive nut (key 9) over the stem (key 5). Run the locknuts (key 27), and travel indicator (key 58) down as far as possible and counter tighten the locknuts (key 27) to lock.

See the following instruction manual (Baumann Actuator Instructions, D103352X012) for reassembly and bench range adjustment.

CAUTION

When assembling or disassembling the valve, do not turn the valve stem while the plug is in contact with the valve seat. This can damage the seating surface very quickly.

Parts Ordering

When corresponding with your Emerson Process Management sales office about this equipment, always mention the valve serial number. When ordering replacement parts, also specify the key number, part name, and desired material using the following parts tables.

⚠ WARNING

Use only genuine Fisher replacement parts. Components that are not supplied by Emerson Process Management should not, under any circumstances, be used in any Fisher valve, because they may void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.

Note

Neither Emerson, Emerson Process Management, nor any of their affiliated entities assumes responsibility for the selection, use, or maintenance of any product. Responsibility for the selection, use, and maintenance of any product remains with the purchaser and end user.

Figure 2. Baumann 24000C Valve Body Assembly with Standard PTFE Spring-Loaded Packing

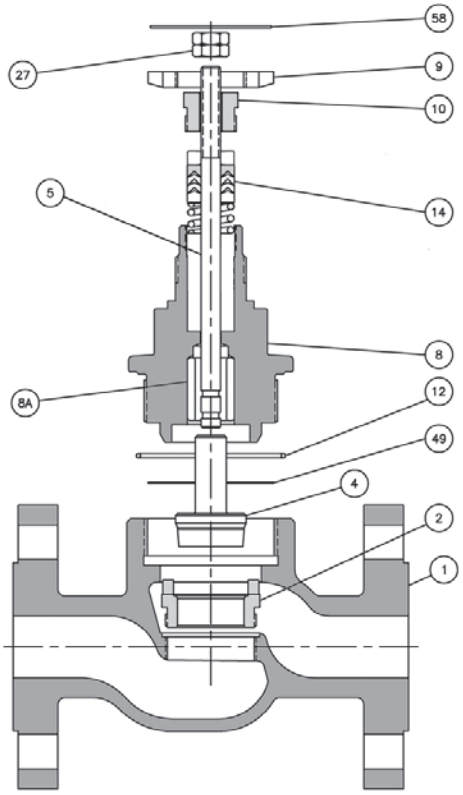


Table 1. Baumann 24000C Common Parts

KEY NO.	DESCRIPTION	VALVE SIZE				
		DN15 (NPS 1/2)	DN20 (NPS 3/4)	DN25 (NPS 1)	DN40 (NPS1-1/2)	DN50 (NPS 2)
1	Valve Body, Carbon Steel, EN PN10-40	24000-111W	24000-211W	24000-311W	24000-511W	24000-611W
	Valve Body, Carbon Steel, ASME CL150 RF	24000-113W	24000-213W	24000-313W	24000-513W	24000-613W
8	Bonnet	24000-121	24000-121	24000-321	24000-521	24000-621
8A	Bonnet Bushing	24000-124				
9	Drive Nut (Yoke)	011757-003-153				
10	Packing Follower	24490-1				
12	O-Ring	24000-151	24000-151	24000-351	24000-551	24000-651
14*	Packing Kit, Spring Loaded PTFE V-Ring (standard)	24494T001				
	Packing Kit, Molded Graphite (optional)	24492T001				
27	Locknuts, qty 2	971514-002-250				
49*	Valve Body Gasket, Copper (standard)	24000-131	24000-131	24000-331	24000-531	24000-631
	Valve Body Gasket, S31600 reinforced Graphite (optional)	24000-132	24000-132	24000-332	24000-532	24000-632
58	Travel Indicator	24299				

*Recommended spare parts

Table 2. Plug for NPS 1/2, 3/4, and 1 Valves - Metal Seat

KEY NO.	DESCRIPTION	PLUG TYPE	PLUG NO.	ORIFICE DIAMETER mm (Inch)	C_v	K_v	VALVE SIZE		
							DN 15 (NPS 1/2)	DN 20 (NPS 3/4)	DN 25 (NPS 1)
4*	Plug & Stem Assy	Metal Seat, Micro Trim (Linear)	102	6.3 (0.25)	0.2(1)	0.17(1)	GE46388X012		GE46388X092
		Metal Seat (Equal %)	548 (S41600)	6.3 (0.25)	0.2A	0.17A	GE46393X092		GE46393X052
					0.5(1)	0.43(1)	GE46394X092		GE46394X052
					1.0(1)	0.86(1)	GE46392X092		GE46392X052
				9.5 (0.375)	1.5(1)	1.29(1)	24634-6-101-548		
					2.5(1)	2.15(1)	24171-12-101-548		
				20.6 (0.8125)	4	3.4	24185-6-101-548		
					7.7	6.6	24061-5-101-548	---	---
					10.1	8.7	---	24061-5-101-548	
				26.9 (1.0625)	13.6	11.7	---	---	24062-1-101-548
		Metal Seat (Equal %)	588 (S41600)	6.3 (0.25)	0.2	0.17	GE46390X052		GE46390X092
					0.5	0.43	GE46391X052		GE46391X092
					1.0	0.86	GE46389X052		GE46389X092
				9.5 (0.375)	1.5(1)	1.29(1)	24634-101-588		
					2.5(1)	2.15(1)	24171-101-588		
				20.6 (0.8125)	4	3.4	24185-101-588		
					7.7	6.6	24061-101-588	---	---
					10.1	8.7	---	24061-101-588	
				26.9 (1.0625)	13.6	11.7	---	---	24062-101-588
		Metal Seat (Linear)	648 (S41600)	6.3 (0.25)	0.5	0.43	GE46398X052		GE46398X092
					1.0	0.86	GE46397X052		GE46397X092
				9.5 (0.375)	1.5	1.29	24669-1-101-648		
					2.5	2.15	24671-2-101-648		
				20.6 (0.8125)	4	3.4	24757-5-101-648		
					6	5.16	24717-3-101-648	---	---
					8	6.88	---	24717-3-101-648	---
					9	7.74	---	---	24717-3-101-648
				26.9 (1.0625)	13	11.18	---	---	24791-1-101-648
		Metal Seat (Linear)	688	6.3 (0.25)	0.5	0.43	GE46396X052		GE46396X092
					1.0	0.86	GE46395X062		GE46395X102
				9.5 (0.375)	1.5	1.29	24669-101-688		
					2.5	2.15	24671-101-688		
				20.6 (0.8125)	4	3.4	24757-101-688		
					6	5.16	24717-101-688	---	---
					8	6.88	---	24717-101-688	---
					9	7.74	---	---	24717-101-688
				26.9 (1.0625)	13	11.18	---	---	24791-101-688

1. A matching seat ring (table 3, key 2) must be furnished with replacement plug orders.

*Recommended spare parts

Table 3. Seat Ring for NPS 1/2, 3/4, and 1 Valves - Metal Seat

KEY NO.	DESCRIPTION	ORIFICE DIAMETER mm (Inch)	VALVE SIZE		
			DN 15 (NPS 1/2)	DN 20 (NPS 3/4)	DN 25 (NPS 1)
2*	Seat Ring S31600(1)	6.3 (0.25 inch)	007635-001-163		24000-341
		9.5 (0.375 inch)	007635-002-163		24000-342
		20.6 (0.8125 inch)	007635-005-163		24000-343
		26.9 (1.0625 inch)	---	---	24000-344
	Seat Ring S41600(1)	6.3 (0.25 inch)	007635-001-416		24000-341-1
		9.5 (0.375 inch)	007635-002-416		24000-342-1
		20.6 (0.8125 inch)	007635-005-416		24000-343-1
		26.9 (1.0625 inch)	---	---	24000-344-1

1. A matching seat ring (key 2) must be furnished with replacement plug orders. See table 2.

Table 4. Plug and Seat Ring for NPS 1/2, 3/4, and 1 Valves - Soft Seat

KEY NO.	DESCRIPTION	PLUG TYPE	PLUG NO.	ORIFICE DIAMETER mm (Inch)	C_v	K_v	VALVE SIZE		
							DN 15 (NPS 1/2)	DN 20 (NPS 3/4)	DN 25 (NPS 1)
4*	Plug and Stem Assy	PTFE Seat (Equal %)	577	9.5 (0.375)	1.0	0.86	24893-101-577		
					1.5	1.29	24796-101-577		
					2.5	2.15	24609-101-577		
				20.6 (0.8125)	4	3.44	24010-2-101-577		
					6	5.16	24010-101-577	---	---
					7.5	6.45	---	24010-101-577	---
					8.5	7.31	---	---	24010-101-577
				26.9 (1.0625)	13	11.2	---	---	24011-101-577
		PTFE Seat (Linear)	677	9.5 (0.375)	0.1	0.086	24660-101-677		
					0.2	0.172	24625-101-677		
					0.5	0.43	24617-101-677		
					1.0	0.86	24631-101-677		
					2.5	2.15	24656-101-677		
				20.6 (0.8125)	5	4.3	24010-1-101-677		
2*	Seat Ring	6.3 mm (0.25 inch) Orifice Diameter					007635-001-163		24000-341
		9.5 mm (0.375 inch) Orifice Diameter					007635-002-163		24000-342
		20.6 mm (0.8125 inch) Orifice Diameter					007635-005-163		24000-343
		26.9 mm (1.0625 inch) Orifice Diameter					---	---	24000-344

*Recommended spare parts

Table 5. Plug and Seat Ring for NPS 1-1/2 and 2 Valves

KEY NO.	DESCRIPTION	PLUG TYPE	PLUG NO.	ORIFICE DIAMETER mm (Inch)	C_v	K_v	VALVE SIZE	
							DN 40 (NPS 1-1/2)	DN 50 (NPS 2)
4*	Plug and Stem Assy	PTFE Seat (Equal %)	577	31.8 (1.25)	20	17.2	24411-102-577	---
				38.1 (1.50)	10	8.6	24884-102-577	
					17	14.62	24774-102-577	
					28	24.08	24254-102-577	
				50.8 (2.0)	30	25.8	---	24882-102-577
		PTFE Seat (Linear)	677	38.1 (1.50)	10	8.6	24799-102-677	
					17	14.62	24798-102-677	
				50.8 (2.0)	30	25.8	---	24891-102-677
					50	43	---	24070-102-677
		Metal Seat (Equal %)	548 (S41600)	31.8 (1.25)	10	8.6	24421-2-102-548	---
					20	17.2	24401-2-102-548	---
				38.1 (1.50)	10	8.6	24635-2-102-548	
					17	14.62	24710-2-102-548	
					32.9	28.3	24038-2-102-548	
				50.8 (2.0)	30	25.8	---	24905-3-102-548
					52.9	45.5	---	24039-1-102-548
		Metal Seat (Equal %)	588	31.8 (1.25)	10	8.6	24421-102-588	---
					20	17.2	24401-102-588	---
				38.1 (1.50)	10	8.6	24635-102-588	
					17	14.62	24710-102-588	
					32.9	28.3	24038-102-588	
				50.8 (2.0)	30	25.8	---	24905-102-588
					52.9	45.5	---	24039-102-588
		Metal Seat (Linear)	648 (S41600)	31.8 (1.25)	10	8.6	24425-1-102-648	---
					20	17.2	24424-1-102-648	---
				38.1 (1.50)	10	8.6	24761-2-102-648	
					17	14.62	24899-2-102-648	
					28	24.08	24760-1-102-648	
				50.8 (2.0)	30	25.8	---	24887-1-102-648
					50	43	---	24762-1-102-648
		Metal Seat (Linear)	688	31.8 (1.25)	10	8.6	24425-102-688	---
					20	17.2	24424-102-688	---
				38.1 (1.50)	10	8.6	24761-102-688	
					17	14.62	24899-102-688	
					28	24.08	24760-102-688	
				50.8 (2.0)	30	25.8	---	24887-102-688
					50	43	---	24762-102-688
2*	Seat Ring	38.1 mm (1.25 inch) Orifice Diameter, S31600					24000-542	---
		38.1 mm (1.50 inch) Orifice Diameter, S31600					24000-541	24000-642
		50.8 mm (2.0 inch) Orifice Diameter, S31600					---	24000-641
		38.1 mm (1.25 inch) Orifice Diameter, S41600					24000-542-1	---
		38.1 mm (1.50 inch) Orifice Diameter, S41600					24000-541-1	24000-642-1
		50.8 mm (2.0 inch) Orifice Diameter, S41600					---	24000-641-1

*Recommended spare parts

Figure 3. Spring Loaded PTFE V-Ring Packing Kit P/N 24494T001

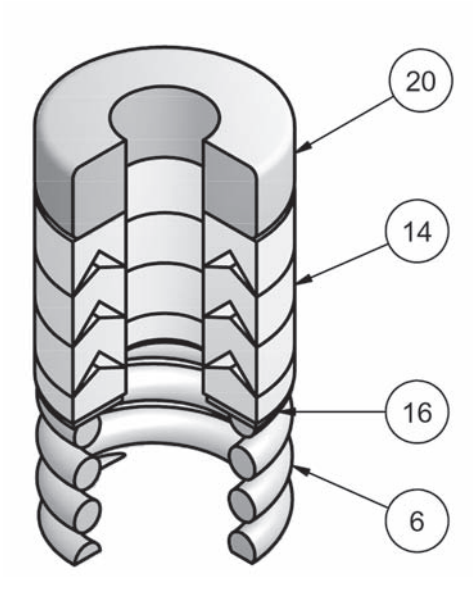


Figure 4. Molded Graphite (Flexible Graphite) Packing Kit P/N 24492T001 (Optional)

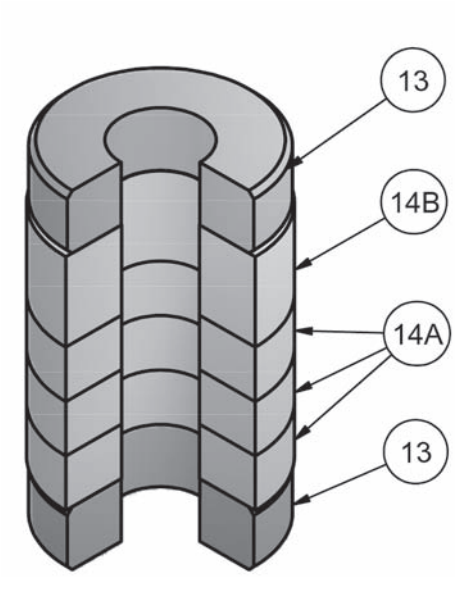


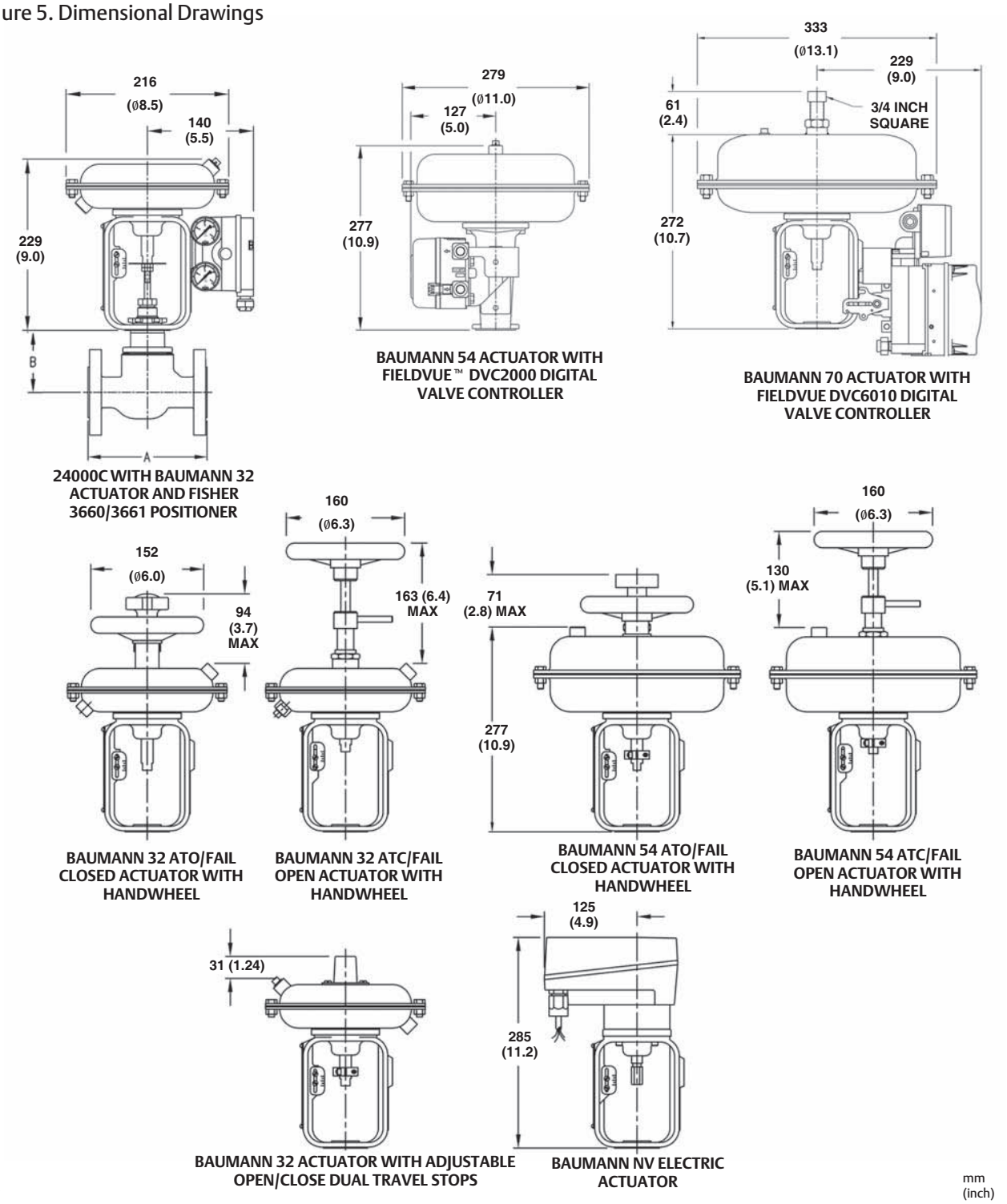
Table 6. Spring Loaded PTFE V-Ring Packing Kit P/N 24494T001

Key No.	Description	Material
6	Spring	ASTM A313 S30200
14	Packing Set	PTFE (Polytetrafluoroethylene)/ 25% carbon filled PTFE
16	Washer	ASTM A240 S31600
20	Spacer	J-2000 (filled Polytetrafluoroethylene)

Table 7. Molded Graphite (Flexible Graphite) Packing Kit P/N 24492T001 (Optional)

Key No.	Description	Material
13	Bushing, Qty 2	Carbon-Graphite
14A	Packing Ring, Qty 3	Graphite
14B	Packing Ring	Graphite

Figure 5. Dimensional Drawings



NOTE: ACTUATOR REMOVAL REQUIRES 115 mm (4-1/2 INCHES) VERTICAL CLEARANCE.

Table 8. Valve Dimensions

VALVE SIZE		A FACE-TO-FACE				B BONNET	
EN	ASME	EN 10-40		CL150			
DN	NPS	mm	in	mm	in	in	mm
15	1/2	130	5.1	184	7.25	3.2	80
20	3/4	150	5.9	184	7.25	3.2	80
25	1	160	6.3	184	7.25	3.3	83
40	1-1/2	200	7.9	222	8.75	3.9	99
50	2	230	9.1	254	10.00	4.2	107

Table 9. Valve Assembly Weights

VALVE SIZE		WEIGHTS	
EN	ASME		
DN	NPS	kg	lb
15	1/2	3.9	9
20	3/4	4.8	11
25	1	6.4	14
40	1-1/2	10	22
50	2	15	33

Table 10. Actuator Weights

ACTUATOR TYPE	WEIGHTS	
	kg	lb
32	4.5	10
54	11.3	25
70	15.4	34
MV1020	10	22
VA1020	13.6	30
NV24-MFT (non spring return)	1.5	3.3
NVF24-MFT or NVF24-MFT-E (spring return)	1.8	4

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